UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
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Seattle, WA 98115-0070

NMFS Tracking
No. 2003/00805

December 15, 2003

Harry Craig
EPA Project Coordinator
U.S. Environmental Protection Agency
Region 10 - Oregon Operations Office
811 SW Sixth Avenue, Third Floor
Portland, Oregon 97204

Re: Biological Opinion and Essential Fish Habitat Consultation for Head of Hylebos Waterway Superfund Remedial Action, Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, WA

Dear Mr. Craig:

In accordance with Section 7 of the Endangered Species Act (ESA), as amended (16 U.S.C. 1531 *et seq.*) and the Magnuson Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (16 U.S.C. 1801 *et seq.*), the attached document transmits NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and MSA consultation on the Superfund removal action for the Head of Hylebos Waterway in Commencement Bay in Pierce County, Washington. The U.S. Environmental Protection Agency (EPA) had determined that the proposed action may affect, and is likely to adversely affect, the Puget Sound (PS) chinook (*Oncorhynchus tshawytscha*) Evolutionarily Significant Unit.

This Opinion reflects the results of a formal ESA consultation and contains an analysis of effects covering PS chinook in Commencement Bay, Washington. The Opinion is based on information provided in the Biological Assessment sent to NOAA Fisheries by the EPA, and additional information transmitted via meetings, telephone conversations, fax and E-mail. A complete administrative record of this consultation is on file at the Washington Habitat Branch Office. NOAA Fisheries concludes that implementation of the proposed project is not likely to jeopardize the continued existence of PS chinook. In your review, please note that the incidental take statement, which includes Reasonable and Prudent Measures and Terms and Conditions, were designed to minimize incidental take.

The MSA consultation concluded that the proposed project may adversely impact designated Essential Fish Habitat (EFH) for chinook and other estuarine species. The Reasonable and Prudent Measures of the ESA consultation, and Terms and Conditions identified therein, would address the negative effects from the proposed EPA actions. Therefore, NOAA Fisheries recommends that they be incorporated as EFH conservation measures.

If you have any questions, please contact Robert Clark at (206) 526-4338 or by email at Robert.Clark@noaa.gov.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Enclosure

Endangered Species Act - Section 7 Consultation
Biological Opinion

and

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Head of Hylebos Waterway
Superfund Remedial Action
Commencement Bay Nearshore/Tideflats
Superfund Site, Tacoma, Washington

Agency:	Environmental Protection Agency
Consultation Conducted By:	NOAA's National Marine Fisheries Service Northwest Region
Issued by:	For Michael R Crouse D. Robert Lohn Regional Administrator
Date:	December 15, 2003
NMFS Tracking No.:	2003/00805

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1.0 INTRODUCTION

1.1 Background and Consultation History

On June 16, 2003, NOAA's National Marine Fisheries Service (NOAA Fisheries) received from the United States Environmental Protection Agency (EPA) a Commencement Bay/Nearshore Tidelands Biological Assessment (BA; July, 2000), a Head of Hylebos Waterway Problem Area Addendum (BA Addendum; April 14, 2003), Appendices (No. 1: June 2003; No. 2: July 2003), an Essential Fish Habitat (EFH) Assessment (August 13, 2003), and a request for Endangered Species Act (ESA) section 7 and Essential Fish Habitat consultations. Formal ESA consultation was initiated on August 15, 2003, because the EPA concluded that, while it may be difficult to quantify demonstrable effects on ESA-listed resources by this action, the conservative position must be taken that the proposed dredging, structure removal and reconstruction, and transition zone grading activities are likely to adversely affect Puget Sound (PS) chinook in the short term.

The EPA, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) issued a unilateral administrative order to ATOFINA Chemicals, Inc. and General Metals of Tacoma, Inc., collectively known as the Head of Hylebos Cleanup Group (HHCG), to remove contaminated sediments from the Hylebos Waterway and dispose of these sediments at an appropriate upland disposal facility. Offsetting conservation measures for this action involved the cleaning up and physical habitat enhancements of selected shorelines under a previous section 7 consultation (NMFS Tracking No. 2003/00483). The purpose of this CERCLA Remedial Action is to address unacceptable risks to the environment and public health from the contaminated sediments. The EPA's removal order to HHCG is considered a Federal action under ESA. The proposed project occurs within the habitat of Puget Sound chinook, specifically in the marine waters of Water Resources Inventory Area (WRIA) 10.

In this CERCLA cleanup, the contaminated sediments are located at the head of the Hylebos Waterway extending roughly from the upper turning basin of the waterway northward about one third of the length of the waterway, comprising portions of EPA Superfund Segments 1 and 2. The Hylebos Waterway is located within the industrial tideflats area of Commencement Bay, Tacoma, Washington. The proposed action will replace highly contaminated intertidal and subtidal sediments with chemically-clean relic deltaic substrates or transition zone materials. NOAA Fisheries concurs with the EPA effect determination of Likely to Adversely Affect.

The objective of this Biological Opinion (Opinion) is to determine whether the proposed action is likely to jeopardize the continued existence of PS chinook. The standards for determining jeopardy are described in section 7(a)(2) of the ESA and further defined in 50 CFR 402.14.

This document also presents the results of NOAA Fisheries' consultation covering EFH, pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), and implementing regulations for EFH found at 50 CFR 600. In their EFH assessment included in the BA, the EPA concluded their actions will benefit EFH by the long-term removal of contaminated sediments, with only minor short-term construction effects when their proposed conservation measures are applied.

Both the Opinion and the EFH consultation are based on information provided in the original BA (EPA 2000a), Addendums, Appendices, meetings, mail correspondence, electronic mail (email) correspondence, and phone conversations, which are contained in the Administrative Record.

The various remedial elements to occur as part of the proposed action and covered by this Opinion include dredging of contaminated sediments, natural recovery with long-term monitoring, slope reconfigurations, the removal of timber piles, the reconstruction of operational facilities using state-of-the-art materials (Hylebos Marina and outfalls), the removal of over-water structures, and habitat enhancements through the use of fish-friendly materials. The EPA is the lead agency for this consultation. This consultation is also meant to satisfy ESA consultation requirements of the U.S. Army Corps of Engineers (COE) for portions of the Hylebos Marina boathouse/dock rebuilding which is a result of the EPA Superfund cleanup but will be conducted separately by the COE (Ref. NMFS Tracking No.: 2003-00481).

1.2 Description of the Proposed Action

The EPA proposes to issue an approval to ATOFINA and General Metals to proceed, under Superfund authority, to remove contaminated sediments with upland disposal, to satisfy its regulatory remedial objective to reduce concentration of hazardous substances to levels that will have no adverse effect on marine organisms.

The remedial action to be implemented by the HHCG consists of dredging open access, under dock, and isolated intertidal areas. The intent of this plan is to actively remediate natural recovery areas with dredging, except for Sediment Management Area (SMA) 102, a natural recovery area underneath the Weyerhaeuser dock (Figure 1). The HHCG's cleanup actions are split between the 2003 and 2004 construction seasons. All work to occur in 2003 (land-based intertidal remediation, in-water demolition and relocation of a portion of the Hylebos Marina) have been addressed as part of the separate section 7 consultation, referred to above. The consultation is split in order to expedite approvals and initiate construction earlier in 2003. The balance of the activities to be completed in 2004 (summer 2004 through early 2005) are addressed herein and include the following primary activities:

- Hylebos Marina Dredging and Reconfiguration
- Structure Removal and Replacement
- Dredging
- Transition Zone Grading

1.2.1 Hylebos Marina Dredging and Reconfiguration

The 2004 dredging plan has been specifically designed to allow the marina to keep functioning, and avoid adverse impacts to the business operations of Hylebos Marina. The project sequencing requires dredging the eastern two-thirds of the Middle Turning Basin at the start of the construction window in 2004. To facilitate this dredging, the eastern-most portion of the marina (located over SMA-233) will be relocated in 2003 to other areas of the Middle Turning Basin (all temporarily relocated floats and moorage will be positioned waterward of the minus 10 foot (ft) mean lower low water (MLLW) contour to avoid shading of littoral habitat. Access to the relocated facilities will be by existing gangways). Following dredging of the original boathouse footprint, the boathouses and associated floats and guide piles will be permanently relocated to a new location in the Middle Turning Basin. No creosote treated timber piles will be used for the relocation. The remaining area will then be dredged to complete the remediation of the Hylebos Marina.

After Project dredging in the Middle Turning Basin is complete, the marina will be fully re-established with the re-construction of the Travelift pier and construction of open-moorage boat slips. Many of the existing boathouses encroach on the Federal navigation channel; by reconfiguring the marina, most of the encroachments should be eliminated. No new boathouses are proposed; approximately 4,500 square feet of additional open moorage slips will be created, but will be over water deeper than minus10 feet MLLW.

Over the course of the Hylebos Marina relocation and cleanup activities, a total of 190 creosote-treated timber piles will be removed (including 25 piles in 2003 and 165 piles in 2004) while 105 new steel float guide piles and 59 new concrete or steel structural piles will be installed. This represents a next reduction of 26 piles. The new concrete and steel piles to be installed will range from 18 to 24 inches in diameter.

<u>1.2.2 Structure Removal and Replacement</u>

The HHGC will remove structures on three aquatic properties to allow for dredging, replacing them following cleanup. The structures are:

- Hylebos Marina (discussed above)
- Kaiser Outfall
- Weyerhaeuser Log Rafting Area
- General Metals Outfall

The Kaiser and Weyerhaeuser structure removal is scheduled to occur during the first month of the 2004 construction window to make the areas available for dredging as soon as the first phase of the Middle Turning Basin dredging is complete.

1.2.2.1 Kaiser Outfall

The marine outfall is located within SMA 121 on the ATOFINA side of the property line with Weyerhaeuser. The outfall extends into the waterway approximately 100 feet to the pierhead line. Kaiser is not currently operating the plant, greatly reducing the volume of water discharged by the outfall. Currently the discharge from the outfall is apparently limited to only storm water from the Kaiser property. To facilitate removal of the impacted sediment at and near the Kaiser outfall, temporary removal of the outfall structure (steel piles) is recommended during dredging. The outfall will be re-installed after dredging, consistent with the existing section 10 permit for the outfall.

1.2.2.2 Weyerhaeuser Log Rafting Area

The cleanup area extends west from the west end of the Weyerhaeuser dock, to the property boundary with ATOFINA, some 700 feet away. This segment of the waterway and shoreline is actively used by Weyerhaeuser for log rafting and log haul-out in support of Weyerhaeuser's primary activity at their property, log export. Dredging will require removal of piles along the shoreline that are used to anchor log rafts and walk ways. Once the dredging is complete, the log staging area will be reconstructed to be consistent with the Washington Department of Ecology (WDOE) Agreed Order with the Wood Debris Group (WDG), which requires that all log-rafting be shifted off shore of the minus 12 foot MLLW contour. Weyerhaeuser will coordinate the design and installation of the piles under their WDG order.

1.2.2.3 General Metal Outfall

A marine outfall extends from the shoreline of the General Metals property out across the mouth of the graving slip into Hylebos Waterway. Two options being considered for the diffuser with regard to the 2004 dredging. The first would be to temporarily remove the outfall and replace it following dredging. The second would be to leave it in place, using dredging setbacks in combination with Transition Zone Grading. The selected option for the outfall will be presented in the 2004 final design package. Because the preferred remedial alternative has not yet been identified in this area, this Opinion addresses the potential impacts associated with either alternative.

1.2.3 Dredging

The Head of Hylebos Waterway will be mechanically dredged to facilitate transportation and placement materials into the selected upland disposal site. The Hylebos sediments to be dredged are fine-grained silts and clays. The dredging plan will incorporate Best Management Practices (BMPs) to reduce the potential for recontamination of remediated areas from sloughing of adjacent impacted material, and to limit the development of a contaminated fluff layer above the native sediments. The thicker deposits of impacted material (10 to 15 feet thick) found outside the navigation channel will be dredged first using a mechanical dredge with a conventional clamshell bucket outfitted with an accurate bucket positioning system, taking care to leave a more uniform, and relatively level, two to three foot thick layer of impacted material throughout the cleanup area. A second dredging pass will use a precision excavator dredge configured with a sealed horizontal profiling bucket to remove the remaining impacted sediment down to native material. The reduced bank height for the second pass will reduce the chance of recontamination of dredged areas from bank sloughing, and facilitates a more efficient and accurate second and final dredge pass. Also, the second pass will generally proceed from top-of- slope down, further reducing the potential of sloughing.

Dredging the waterway side slopes is calculated by assuming post-dredge slopes of approximately 2 feet horizontal to 1 foot vertical, to generally match the original shape of the waterway. The target depth of dredging within each Dredging Management Area (DMA) will initially be set at about 0.75 foot below the deepest estimate of impacted sediment within that DMA. If progress sampling indicates any areas which fail to meet the performance standards following dredging, and additional dredging is determined to be appropriate, the intent would be to dig into the native material in order to assure complete removal of the overlying material.

Actual daily dredging production rates will depend on the nature of the material being removed, the thickness of the cut, and the equipment used by the contractor. For planning purposes a production rate of 2,000 cubic yards (cy) per day is assumed, working 24 hours per day, seven days per week. It is anticipated that the contractor will use 1,000- to 1,500-cy bottom-dump (sealed) or flat deck barges towed by tug of suitable size, for general waterway dredging and sediment transport.

As part of the project BMPs, the haul barges will be set up with controlled overflow points to return excess water to the waterway during barge filling. The barge overflow water will pass through straw bales to reduce turbidity associated with the overflow.

The HHGC will place dredged material on barges for transport to the offloading site at the ATOFINA dock, located at the head of Hylebos waterway within the project boundaries. Dredged material will be transferred from haul barges to rail cars located on the adjacent upland. The engineering controls for the waterfront offload facility will limit loss of sediment during transfer and potential stockpiling, including potential losses from sediment drainage and rainfall runoff.

A crane or excavator located on the ATOFINA dock will transfer the dredged material from the barge to contained transfer facilities on the dock. An apron constructed from the dock over the edge of the barge, below the swing path of the bucket, will contain any spillage from the bucket. Any material that falls onto the apron will be placed back onto the barge, or onto the contained transfer dock. Once at the dock, HHGC will transfer the dredged material to lined rail cars on a rail spur adjacent to the dock, for delivery to the Roosevelt Regional Landfill. The material will be transferred into rail cars by either a conveyor system or by front-end loaders. The ATOFINA dock has a concrete deck and curbs for full containment. The dredged material transfer facility takes advantage of the existing containment system to provide for full capture of storm water and water from the dredged material. The captured water will be collected into holding tanks and discharged under the requirements of the Water Quality Certificate for the project.

The Head of Hylebos Pilot Remediation Program conducted during December 2001 successfully demonstrated the effectiveness of plastic linings. Such lining will be on a siding at the ATOFINA property. Debris encountered during dredging will be sent to a landfill, except for easily segregated metal, which will be delivered to General Metals for recycling.

1.2.3.1 Dredging Open Access Cleanup Areas

Open Access sediments slated for dredging in the Head of Hylebos Waterway are illustrated on

Figure 1, and include SMAs 121, 122, 125 and 221 and Hylebos Wood Debris Sites (HWDS) 1, 2, and 3. Bottom sediments in these areas consist of fine-grained silts and clays, located below MLLW. Final proposed dredge elevations within these areas range from between approximately minus 30 ft and 37 ft.

Areas slated for open access dredging are owned and operated by a number of parties including the Port of Tacoma, ATOFINA, Weyerhaeuser and others. Typical uses within the areas slated for open access dredging include navigation, log rafting and haul out areas. Dredging along the Weyerhaeuser property will necessitate removing piles along the shoreline that are used to anchor log rafts and walk ways. The non-treated piles on Weyerhaeuser property will be re-installed following dredging, provided required permits are obtained. Table 1 presents the estimated dredging volume for each open access sediment remedial action area, based on the pre-remedial design dredging plan.

Table 1. Open Access Dredging Areas and Pre-Remedial Design Volumes at the Head of Hylebos Waterway.

Open Access Area	Size (Acres)	Volume (cy)	Adjacent Shoreline Property	Remedial Action
121	6.8	78,000	Several	Dredging
122	0.4	3,000	Weyerhaeuser	Dredging
125	0.9	9,000	Several	Dredging
HWDS-1,2,3	6.2	100,000	several	Dredging
221	22.8	236,000	Several	Dredging
	37.1	426,000		

Overall, this Project component involves dredging approximately 426,000 cy of material from the Head of the Hylebos Waterway for disposal into the selected upland disposal site.

1.2.3.2 Ace Tank Dredging (SMA 131)

The SMA 131 is located beneath the outfitting pier at Ace Tank and Equipment (Ace Tank) along the eastern shore of the Hylebos Waterway. This dock-covered area is 30 feet wide and 350 feet long, between navigation channel stations 140+50 and 144+00. Slopes beneath the dock are on the order of 2.5 feet horizontal to one foot vertical. The dock is adjacent to and parallels an open portion of intertidal slope. The upslope face of the dock starts at a mudline elevation of about zero feet MLLW, with the downslope face of the dock at about minus 20 feet MLLW.

Ace Tank purchased the Tacoma Boatbuilding property in June 1998. With WDOE oversight, Ace Tank cleaned up the open intertidal areas (areas above zero feet MLLW) of the site during the summer of 1998. Ace Tank removed sediment containing sandblast grit from the open intertidal area that parallels the dock, extending out to zero ft MLLW at the upslope face of the pier. Sandblast grit and sediment containing sandblast grit remain in the subtidal area of SMA

131 beneath the dock. During intertidal cleanup, the sandblast grit was observed to be two to three feet thick at the upslope edge of the dock.

The impacted sediment beneath the dock will be removed by dredging 3,000 cy of material to reach native sediments. Dredging is expected to occur during daylight periods of low tides, to take advantage of increased vertical clearance under the dock. After dredging, the dredged area will be dressed with one to three feet of Transition Zone Grading Material (TZGM) consisting of sand and gravel. The remedial action at SMA 131 will take from a two weeks to a month.

A total of approximately 0.3 acre of habitat between the elevations of zero feet and minus 20 feet MLLW will be remediated in this Project component. Approximately half of this total area (0.15 acre) is littoral habitat above elevation minus 10 feet MLLW. Substrate characteristics will be modified by adding the TZGM. This will improve habitat characteristics for salmonids in this area, consistent with Performance Criteria A.1.d in the Commencement Bay/Nearshore (CB/NT) Explanation of Significant Differences (ESD; EPA 2000b), which requires capping material that promotes colonization by aquatic organisms.

1.2.3.3 Hylebos Marina Dredging (SMA 233)

The marina-covered area is in the middle turning basin of Hylebos Waterway, between navigation channel stations 112+00 and 122+00, along the east bank of the waterway. Slopes beneath the marina are on the order of two to three feet horizontal to one foot vertical.

The impacted sediment beneath the docks and boat sheds will be dredged, requiring temporary relocation of the boats and marina structures in order to access the sediments. To facilitate moving the marina and completing all of the dredging in one construction window, the new location for the marina will be the first area dredged in 2004. Overall, dredging beneath the Hylebos Marina would remove 30,000 cy of material (SMA 233 only). Dredging associated with this component will remediate approximately 3.2 acres of littoral and subtidal habitat.

1.2.3.4 ATOFINA Dredging (SMA 231)

The shoreline area of the ATOFINA property (SMA 231) from elevation zero feet MLLW to approximately minus 20 feet MLLW will be dredged, rather than capped as originally planned. Dredging this area will remove approximately 4,000 to 8,000 cy of material.

The upper portion of the intertidal habitat along the ATOFINA shoreline behind the existing ATOFINA Dock (between approximately elevation 10 ft and 11.8 ft MLLW) supports two small patches of saltmarsh vegetation. Vegetation in these areas is primarily pickleweed at the lower elevations, and transitions up to saltgrass or tufted hairgrass near the Mean Higher High Water (MHHW) line. Based on a habitat assessment completed by Grette Associates (2003a, 2003b), saltmarsh vegetation within these two areas covers an area of approximately 0.06 acre.

Characterization sampling behind the ATOFINA dock in May 2003 disclosed that the surface sediments in the area of the existing saltmarsh exceed the Sediment Quality Objectives (SQOs). Consequently, the saltmarsh area will be remediated late in 2004, after waterway dredging is complete. The remedial actions will cause the loss of the salt marsh, therefore the existing salt marsh will be relocated, prior to the remediation, to the Salt Pad Area of ATOFINA.

Modifications to the EPA-approved 2003 RA Work Plan will add the following actions at the Salt Pad Area, as outlined in the ATOFINA Saltmarsh Relocation Plan (Dalton, Olmsted & Fuglevand, Inc. 2003):

- Decrease the slope of the upper shoreline at the Salt Pad Area by shifting the 10.5 feet MLLW contour further towards the waterway. Completed during July and August 2003.

- Add soil amendments between the 10.5 and 12 feet MLLW contours of the Salt Pad Area to increase fines (clay and silt) content making it more suitable for saltmarsh vegetation. Scheduled for September 2003.

- Seed a portion of the Salt Pad Area with saltmarsh stock consisting of seashore saltgrass, sea arrowgrass (*Triglochin maritimum*), and tufted hairgrass (*Descampsia cespitosa*) between 12 and 14 ft MLLW. Scheduled for fall of 2003.

- Saltmarsh planting of the Salt Pad Area with bare root pickleweed and fleshy jaumea (spacing 1 foot on center) plus placement of goose exclusion between 11 and 12 ft MLLW. Scheduled for the spring of 2004.

- Monitor the saltmarsh at the Salt Pad Area for the first three years after planting, including visual observation and photographs and measurement of area coverage and stem density, as more specifically detailed in Appendix A of the ATOFINA Saltmarsh Relocation Plan. Scheduled for late summer / early fall of 2004, 2005 and 2006.

These modifications will yield a more gradual slope and finer sediments that are suitable habitat for saltmarsh vegetation. Saltmarsh relocation to the Salt Pad Area is scheduled to occur prior to the intertidal remediation activities at SMA 231 (late 2004 to early 2005). All other ATOFINA bank cleanup actions will occur as approved.

The proposed mitigation action at the ATOFINA Dock Area entails placement of four large woody debris (LWD) cover structures at the MHHW line (the MHHW line corresponds to 11.8 ft MLLW) behind the ATOFINA dock following completion of the remedial action at the dock.

1.2.4 Natural Recovery Areas

The SMA 102 is a subtidal Dock/Structure SMA beneath the Weyerhaeuser dock, near navigation channel station 155+00. Long-term monitoring at this SMA will evaluate natural recovery (Dalton, Olmsted & Fuglevand 2002a).

Two of the natural recovery areas are associated with cleanup plans by other parties. The SMA 101 is associated with the WDG, and SMA 103 is associated with Port of Tacoma's property and is expected to be part of the Port of Tacoma/Occidental Chemical cleanup plan. The remaining natural recovery area will be addressed by this plan, as summarized in Table 2, and will be actively remediated by dredging SMA 204.

Table 2. Natural Recovery Areas at Head of Hylebos Waterway.

Waterway Segment	SMA Area	Size (Acres)	Adjacent Shoreline Property	Included In Plan	Cleanup Considerations
1	102	0.2	Weyerhaeuser	Yes	Natural Recovery
2	204	2.3	General Metals	Yes	Dredging
		2.5			

1.2.5 Transition Zone Grading

The marine dredging areas generally daylight near the top of the slope along the shoreline. However, this cannot happen along existing structures (Structure Transition Zone), or at the ends of the project (End Transition Zone). At these locations the final dredge cut slope will be dressed with sand and gravel to stabilize the face. This transition zone grading will generally consist of a 25-foot wide by 3-foot thick blanket of sand and gravel placed along and over the length of the dredge cut.

The TZGM will be a well-graded sand and gravel material composed of naturally rounded rock (no crushed rock). Two potential sources of the material are:

- Sand and gravel pits located near the Head of Hylebos Waterway. Material from these pits was used for the Ace Tank cleanup on Hylebos Waterway.

- Glacier Pioneer Aggregate Plant No. 1 (Dupont, WA area) material that was used as habitat mix by the City of Tacoma for the Thea Foss Esplanade project.

The depth of cut and transition slope within 15 feet of structures (Structure Transition Zone) will be limited to protect structure stability. The cut depths within the Structure Transition Zone will be three feet or less, and will be immediately backfilled with TZGM, following the second pass dredging.

1.2.6 Duration and Timing of Construction Activities

In-water work will be conducted 24 hours per day, seven days per week during an uninterrupted construction window between July 16 2004 and February 14 2005. In-water work will not be performed between February 15 and the following July 15 each year in order to protect fisheries resources. Upland construction will be conducted year round, seven days a week, 24 hours per day.

The seven month construction window provides 203 available work days (213 days less 10 holidays). Of the 203 available days, 10 are designated for ramp up at the start of the project, 10 are designated for ramp down at the end of the project, and 30 days for corrective actions and contingency. That leaves 153 days for in-water construction activities. Demolition and relocation is estimated to take 10 to 15 days, with the first and second pass dredging estimated to take another 135 days.

Construction is scheduled to begin July 16 to allow adequate time to complete the project in one construction season. The schedule is aggressive (seven days a week, 24 hours a day) with limited contingency days. However, it is intended to minimize the risk that the activities would have to be completed after February 14, a period when small (1.5-1.8 inches long) chinook salmon could be present in the waterway. Should unforeseen circumstances require, any of the project elements could be delayed for one year under this Opinion.

1.3 Description of the Action Area

An action area is defined by NOAA Fisheries regulations (50 CFR 402.02) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved by the action." The action area for the proposed project includes all portions of the Commencement Bay shoreline from midway between Brown's Point and Hylebos Waterway to the southern boundary of the Asarco site at depths less than minus 60 ft MLLW and Puyallup River downstream from the I-5 bridge. This action area corresponds to that which was used in the BA prepared for remediation of the entire CB/NT Superfund Site (EPA 2000a). Section 4 of the CB/NT BA includes a detailed description of the historic and current conditions in the action area and should be referenced for this information. This broader area is termed the "action area" to distinguish it from the Project Area, which is the area where construction activities will occur.

2.0 ENDANGERED SPECIES ACT BIOLOGICAL OPINION

2.1 Evaluating Proposed Actions

The purpose of consultation under ESA is to ensure that any action authorized, funded, or carried out by a Federal agency is not likely to jeopardize the continued existence of threatened or endangered species. The term "species" includes any distinct population segment of a species (16 U.S.C. 1532(16). The PS chinook are an Evolutionarily Significant Unit (ESU) of chinook salmon, and are considered a distinct population segment. Formal consultation required by section 7(a)(2) of the ESA concludes with the issuance of an Opinion, as described in section 7(b)(3) of the ESA.

The standards for determining jeopardy as set forth in section 7(a)(2) of the ESA are defined by 50 CFR Part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify designated critical habitat. Critical Habitat is not currently designated for PS chinook, and that analysis will not be presented in this document. The jeopardy analysis involves the initial steps of: (1) defining the biological requirements of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

NOAA Fisheries then evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of injury and mortality attributable to: (1) collective effects of the proposed or continuing action, (2) the environmental baseline, and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. A finding of jeopardy is appropriate if the action, together with the effects of baseline conditions and cumulative effects, appreciably reduces the species' likelihood of survival or recovery by reducing the numbers, distribution, or reproduction of the species. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

2.1.1 Biological Requirements

The first step NOAA Fisheries uses when conducting the ESA section 7(a)(2) analysis is to define the species' biological requirements. Biological requirements are those conditions necessary for the listed ESU's to survive and recover to naturally reproducing population sizes at which protection under the ESA would become unnecessary. This will occur when populations are large enough to safeguard the genetic diversity of the listed ESUs, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

The biological requirements for PS chinook include adequate food (energy) source, flow regime, water quality, habitat structure, passage conditions (migratory access to and from potential spawning and rearing areas), and biotic interactions (Spence *et al.* 1996). The specific biological requirements for PS chinook that are influenced by the action considered in this Opinion include food, water quality, habitat structure, and biotic interactions. For this specific action, NOAA Fisheries' analysis considers the extent to which the proposed action impairs or improves the function of habitat elements necessary for rearing, refugia, and migration of PS chinook.

2.1.2 Status of the Species

When NOAA Fisheries considers the current status of the listed species it takes into account species information, e.g., population size, trends, distribution, and genetic diversity. To assess the current status of the listed species NOAA Fisheries starts with the determinations made in its decision to list for ESA protection the ESUs considered in this Opinion and also considers any new data that are relevant to the determination.

Puget Sound chinook salmon was listed as threatened under ESA on March 24, 1999 (64 FR 14308). The ESU includes all naturally spawned populations of chinook salmon from rivers and streams flowing into Puget Sound. The area also includes the Straits of Juan de Fuca from the Elwha River, eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington State. The species status review identified the high level of hatchery production which masks severe population depression in the ESU, as well as severe degradation of spawning and rearing habitats, and restriction or elimination of migratory access, as causes for the range-wide decline in PS chinook salmon stocks (NOAA Fisheries 1998a, and 1998b).

Overall abundance of chinook salmon in this ESU has declined substantially from historical levels. Many populations are small enough that genetic and demographic risks are likely to be relatively high. Long-term trends in abundance are predominately downward, with several populations exhibiting short-term declines. Factors contributing to the downward trend are widespread stream blockages, degraded habitat, with upper tributaries widely affected by poor forestry practices and lower tributaries and mainstream rivers affected by urbanization and agriculture. Hatchery production and releases of chinook salmon in PS are widespread and more than half of the recent total PS escapement returned to hatcheries.

Juvenile chinook migrating through the Puyallup River delta and Commencement Bay originate from three basic stocks (Wash. SASSI, 1992): White (Puyallup) River spring; White River summer/fall; and Puyallup River fall. Juvenile salmon use estuaries for physiological adaption, foraging, and refuge. As described by Simenstad (2000), some aspects of the early life history of juveniles in estuaries are obligatory, such as the physiological requirement to adapt from freshwater to saltwater. Generalized habitat requirements of juvenile chinook in estuaries include shallow water, typically low gradient habitats with fine unconsolidated substrates and aquatic, emergent vegetation; areas of low current and wave energy; and concentrations of small epibenthic invertebrates (Simenstad *et al.* 1985).

Artificial propagation programs likely provide most of the numbers of chinook in the Puyallup River. The White River spring chinook population which is considered critical by state and tribal fisheries managers depends largely on artificial production (Wash. SASSI 1992). The White River spring chinook have lately experienced a tenuous rebound as escapement gradually has increased from the historic lows of the 1980s. In 2000, non-tagged returns of adults was 1,732 individuals, the largest return in 30 years. This increase is consistent with larger numbers of chinook in the Columbia River during 2000, indicating good ocean survival (NOAA Fisheries 2001).

The White River summer/fall chinook stock is considered wild and classified by the co-managers as distinct, based on geographic distribution. The glacial melt waters, typical of the Puyallup River, cause poor visibility during spawning season. Because of this, the stock status is unknown (Wash. SASSI 1992).

Numbers of Puyallup fall chinook have recently been compiled by the Puyallup Tribe of Indians for the Washington State Shared Strategy indicating the current number of spawners at 2,400. The Washington Shared Strategy is a voluntary and collaborative effort that is developing goals for recovery planning ranges and targets, building on existing efforts of local governments, watershed groups, and various state, Federal, and tribal entities to produce a viable recovery plan. Targets relating the quality and capacity of chinook habitat to population response associated with recovered habitat indicated a range of 5,300 to 18,000 spawners necessary for a recovered system (Puyallup Tribe 2002).

Field observations of PS chinook in the action area revealed that habitat use differed between the mouth and the head of waterways and also between the locations of the waterways in relation to the Puyallup River. The Puyallup Tribe of Indians conducted beach seine sampling between the years 1980 and 1995 (however, no data were available in 1988, 1989, and 1990). Duker *et al.* (1989) conducted an extensive beach seine juvenile sampling effort in 1983 at many of the same beach seine sampling locations as the tribe's efforts, plus tow net sampling to investigate distribution in the open water habitats of Commencement Bay. In addition, sampling of salmonid distribution has been conducted at a number of sites during the course of impact assessment and/or mitigation site planning. Some general conclusions from these studies indicated that: juvenile chinook are present in low numbers in March, peak in late May or early June and drop to low numbers again by July 1; the progeny of naturally spawned chinook arrive in the estuary throughout this period at a variety of lengths; offshore catches of chinook peak about 2 weeks later than shoreline catches; and all shorelines are used but catches are typically higher near the mouths of the waterways than near the heads (Kerwin 1999). Hooper (in USFWS 2001) compiled catch per unit effort of chinook salmon at sites close to and further away from the Puyallup River. This data found that the catch per unit effort averaged 20.4 in the Milwaukee Waterway, 2.93 in the Blair Waterway and 1.99 in the Hylebos Waterway. The catch per unit was higher in the waterways closest to the river (USFWS 2001).

2.1.3 Environmental Baseline

The environmental baseline represents the current conditions to which the effects of the proposed Action would be added. The term "environmental baseline" means "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process" (50 CFR 402.02).

Numerous activities affect the present environmental baseline conditions in the action area including expanding urban development, railroads, shipping, logging, agriculture, and other industries. The present port area of Tacoma was created during the late 1800s and early part of the 1900s by filling the tidal marsh that had developed on the shelf of the Puyallup River delta. Continuing habitat alterations such as dredging, relocation and diking of the Puyallup River, dredging/construction of the waterways for purposes of navigation and commerce, steepening and hardening formerly sloping and/or soft shorelines with a variety of materials, and the ongoing development of the Port of Tacoma and other entities has resulted in substantial habitat loss (Sherwood *et al.* 1990, Simenstad *et al.* 1993).

Historically, this area comprised the estuarine delta of the Puyallup River. With the growth and development of Tacoma, its port, and the surrounding region, the delta has been subjected to dramatic environmental changes, primarily from dredging and filling to create the waterways. Past development activities along the shorelines of Commencement Bay have affected, and future activities may affect, the habitat and the fish that use it (Duker *et al.* 1989). It has been estimated that of the original 2,100 acres of historical intertidal mudflat, approximately 180 acres remain today (COE *et al.* 1993). Fifty-five acres of the 180 acres of low gradient habitat are located near the mouth of the Puyallup River, twenty acres are the Milwaukee habitat area, 18 acres are located bayward of the East Eleventh Street Bridge in the Hylebos Waterway, 54 acres are located in the rest of the Hylebos Waterway, 46 acres are present along the shoreline from the mouth of the Hylebos to Browns Point, and eight acres are located in the Blair Waterway (Pacific International Engineering 2001b). Graeber (1999) states that 70% of Commencement Bay estuarine wetlands and over 98% of the historic Puyallup River estuary wetlands have been lost over the past 125 years.

The historical migration routes of anadromous salmonids into off-channel distributary channels and sloughs have largely been eliminated and historical saltwater transition zones are lacking (Kerwin 1999). Additionally, the chemical contamination of sediments, in certain areas of the Bay, has compromised the effectiveness of the remaining habitat (COE *et al.* 1993, USFWS and NOAA 1997).

In 1981, the EPA listed Commencement Bay as a Federal CERCLA site. As a result, the clean up of contaminants has been a high priority and has resulted in 63 of 70 sites being remediated (Kerwin 1999). In 1993-1995, the entire Blair Waterway navigation channel was dredged as part of the Sitcum Waterway Remediation Project. Contaminated sediments were removed and capped in the Milwaukee Waterway nearshore confined disposal site. After the completion of the dredging, the EPA deleted the Blair Waterway and all lands that drain to the Blair Waterway from the National Priorities List (Pacific International Engineering 2001a).

The shorelines of Commencement Bay have been highly altered by the use of riprap and other materials to provide bank protection. Bulkheads cover 71% of the length of the Commencement Bay shoreline. Based on shoreline surveys and aerial photo interpretation of the area, approximately 5 miles, or 20% of the Commencement Bay shoreline, is covered by wide over-water structures (Kerwin 1999). These highly modified habitats generally provide poor habitat for juvenile salmon (Spence *et al.* 1996).

From 1917 to 1927, most of the habitat alteration (162 acres of mudflat, 72 acres of marsh) resulted from dredging the various waterways and from filling to build uplands for piers, wharves, and warehouses (USFWS and NOAA 1996). Currently natural aquatic habitats are highly fragmented and dispersed across the delta and Bay with few natural corridors linking them. Fish preferentially occupy shallow water areas, and have been documented in mitigation and restoration sites (Miyamoto *et al.* 1980, Duker *et al.* 1989, Pacific International Engineering 1999b) both north and south of the river mouth, although perhaps tending more to the north (Simenstad 2000). Commencement Bay is a documented rearing and migration corridor for chinook salmon (Simenstad *et al.* 1982, Duker *et al.* 1989, Wash. SASSI 1992, Pacific International Engineering 1999b, Simenstad 2000). Some modified and relic habitats and most mitigation habitats along the delta front and in the waterways still support juvenile salmon by providing attributes such as food and refuge. However, negative impacts to salmon from their migration through and residence in the delta-Bay system has not been quantified (Simenstad 2000).

The Port of Tacoma currently comprises 2,400 acres of upland that support numerous commercial or industrial activities located on or adjacent to each of the waterways (Blair, Hylebos, and Sitcum). Baywide, these industries include pulp and lumber mills, shipbuilding and ship repair facilities, shipping docks, marinas, chlorine and chemical production, concrete production, aluminum smelting, oil refining and food processing plants, automotive repair shops, railroad operations, and numerous other storage, transportation, and chemical manufacturing plants.

2.1.4 Relevance of Baseline to Status of Species

The environmental baseline is significantly degraded. Ninety-eight percent of historically available intertidal marsh and mudflat habitat, necessary for estuarine lifestage (smoltification) of juvenile salmonids, has been lost due to the above described human activities. The remaining two percent of estuarine habitat is seriously degraded by the presence of toxic and hazardous contaminants in the sediments, which is the habitat for the prey organisms of juvenile salmonids. The baseline conditions of the action area are a significant factor in the current depressed status of PS chinook.

At present, salmonid habitat within Commencement Bay shorelines is gradually increasing in acreage because of habitat restoration projects and natural processes. Approximately 50 acres of intertidal and shallow subtidal habitat have been created through previous restoration actions.

2.2 Effects of the Proposed Action

NOAA Fisheries must consider the estimated level of injury and mortality from the effects of the proposed action. ESA implementing regulations define “effects of the action” as “the direct and indirect effects of an action on the species or habitat together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline” (50 CFR 402.02)

2.2.1 Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future Federal actions that are not a direct, interdependent, or interrelated, effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated (50 CFR 402.02).

The direct effects of the project derive from the nature, extent, and duration of the construction activities in the water and whether the fish are migrating and rearing at that time. Direct effects of the project also include immediate habitat modifications resulting from the project. In the proposed project, immediate positive effects include the removal of highly contaminated materials from the intertidal area which juvenile salmonids use. Negative effects may occur during various construction activities, including the dredging of highly contaminated sediments and the removal and reconstruction of in- and over-water structures. However, these effects are confined to a relatively small area and short time period.

2.2.1.1 Dredging

The dredging area encompasses nearly 41 acres, all of which is below zero feet MLLW. Dredging will remove sediments exceeding SQO criteria in the Hylebos Waterway, exposing native sediment that were not subject to historical contamination. This activity does not permanently convert littoral habitat to subtidal. The project includes dredging of approximately 459,000 cy of contaminated sediments.

Sediment plumes are often associated with dredging. Dredging activities disturb and suspend sediment creating turbid conditions, which cause discoloration of the water, reducing light penetration and visibility, and changing the chemical characteristics of the water. The size of the sediment particles and tidal currents are typically correlated with the duration of sediment suspension in the water column. Larger particles, such as sand and gravel, settle rapidly, but silt and very fine sediment may be suspended for several hours. LaSalle (1990) described a downstream plume that extended 900 feet at the surface and 1,500 feet at the bottom. LaSalle (1990) also noted an increase in sediment levels upwards of 70% from the effect of the pressure wave created by the dredge bucket as it descended through the water.

The potential mechanisms by which turbidity could affect salmonids include direct mortality, injury by entrainment, sublethal effects (stress, gill damage, and increased susceptibility to disease), and behavioral responses (disruptions to feeding or migration) (Pacific International Engineering 2001a). Long-term ecosystem effects of dredging generally include changes in the volume and area of habitat, periodic changes to primary and secondary production (food web effects), and changes in hydrodynamics and sedimentology (Nightingale and Simenstad 2001).

Biological effects to PS chinook salmon may result from: (1) temporary reduction in water quality and increased noise disturbance associated with dredging that potentially could exclude salmonids from their estuarine sediment substrates; (2) seasonal loss of benthic organisms and other prey due to disturbance of the sediment substrates; (3) short-term alteration to nearshore habitats; and (4) potential exposure to contaminated sediments or water.

Water quality monitoring performed during a December 2002 Pilot Program indicated that the effects of increased turbidity during dredging should be minimal (Dalton, Olmsted & Fuglevand 2002b). In-situ turbidity during dredging will be monitored and operational changes implemented through BMPs to comply with water quality criteria at the mixing zone boundary.

The impacts on water quality (from suspended sediments and altered chemical composition) from dredging can have detrimental effects on salmonids. Suspended sediments can have an adverse effect on migratory and social behavior as well as foraging opportunities (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985). Servizi (1988) observed an increase in sensitive biochemical stress indicators and an increase in gill flaring when salmonids were exposed to high levels of turbidity (gill flaring allows the fish to create sudden changes in buccal cavity pressure, which acts similar to a cough). Chemical composition of the water with suspended sediments is also affected by dredging activities. Estuarine sediments are typically anaerobic (anoxic) and create an oxygen demand when suspended in the water column, and in turn would decrease Dissolved Oxygen (DO) levels (Hicks *et al.* 1991; Morton 1976).

A review of the processes associated with DO reduction (Lunz and LaSalle 1986; Lunz *et al.* 1988) suggested that DO demand of suspended sediment is a function of the amount of material placed into the water, the oxygen demand of the sediment, and the duration of suspension. Dissolved Oxygen reductions appear to be most severe lower in the water column and usually the condition reverses with adequate tidal flushing (LaSalle 1990). Most of the research reported to date indicated that dredging-induced DO reductions are a short-term phenomena and do not cause problems in most estuarine systems (Slotta *et al.* 1974; Smith *et al.* 1976; Markey and Putnam 1976). The level of DO will be monitored during dredging; operational changes will be implemented as necessary to comply with water quality criteria at the mixing zone boundary.

Decreases in DO levels have been shown to affect swimming performance levels in salmonids (Bjornn and Reiser 1991). The decrease of swimming performance due to decreases in DO could directly affect the chinook salmon's ability to escape potential predation or could affect their ability to forage on motile fish. Smith *et al.* (1976) found DO levels up to 2.9 milligrams per liter (mg/l) during dredging activities in Grays Harbor. Hicks (1999) observed salmon avoidance reactions when DO levels dropped below 5.5 mg/l. Dredging fine sediments such as those found in the Hylebos Waterway could create a sediment plume that may not disperse rapidly because of tidal fluctuations, especially during incoming tides. This could create poor water quality (*i.e.*, decreased dissolved oxygen levels) that might impede chinook salmon from immigrating into the Hylebos Waterway to gain access to foraging, rearing, and/or refugia habitats.

Using observations acquired during dredging at the Head of the Hylebos by Weyerhaeuser in 2001, dredging activities are not expected to substantially depress DO in the Waterway during the fall and winter months. In addition, the volume of wood debris present in the project area is much lower than in the adjacent areas of the Head of the Waterway, where higher loadings of wood debris have historically depressed summer seasonal DO levels.

Based on the EPA's (2000a) analysis of the effects of increased suspended sediment concentrations on salmonid species (see section 7.1 of the CB/NT BA) and the results of dredged material modeling in the BA Addendum, the dredging of this project would not produce suspended sediment concentrations dangerous to salmonids. In addition, the contractor will be responsible for submitting a Construction Control Plan, which will present the system through which the contractor assures project compliance with the Water Quality Standards. Further, turbidity will be monitored in the vicinity of dredging operations during and for specific times before and after construction. If Water Quality Criteria are exceeded at the compliance boundary the contractor will be required to modify the operations. Such modifications may include slowing the dredging rate.

The potential for short-term loss of chemicals to the waters of Commencement Bay during Project dredging was analyzed during the Pre-Remedial Design Investigation (Dalton, Olmsted & Fuglevand *et al.* 2001). A Standard Elutriate Test, Modified Elutriate Test, and Dredging Elutriate Test were conducted to evaluate the potential for water quality impacts at the point of dredging. All of the tests yielded results below the applicable EPA acute marine water quality criteria. The results of these analyses indicate that dredging would not result in chemical concentrations within the water column that are harmful for listed salmonids. Further, water quality impacts associated with dredging are temporary in nature and generally restricted to the point of dredging (Bohlen *et al.* 1979). Overall, dredging of project sediment would not result in short-term water quality impacts attributable to dissolution of chemical from sediment that would adversely affect chinook salmon.

Disruption of the channel bottom and entrainment by dredging has a negative impact on benthic biota and forage fish. Filter feeding benthic organisms can suffer from clogged feeding structures, reduced feeding efficiency, and increased stress levels (Hynes 1970). Dredging may also suppress the ability of some benthic species to colonize in the dredged area, thus creating a loss of benthic diversity and food source for the chinook salmon prey species. Dredging will temporarily disturb approximately 6.4 acres of littoral (above minus 10 ft MLLW) habitat for chinook salmon and will likely reduce foraging opportunities, which may cause them to migrate into deeper waters where there is greater vulnerability to predation and less foraging opportunities. However due to the level of contamination and the physical quality of the existing substrate, the subtidal benthic community in the project area is already seriously depressed.

While dredging can cause a short-term change in the littoral epibenthic community, it is expected due to timing of construction and the rapid rate of recolonization observed at other sites in Commencement Bay (Jones & Stokes 1988; 1991a, 1991b; Parametrix 1996; Pacific International Engineering 1998a, 1998b) that epibenthic organisms will recolonize the disturbed area prior to the early spring migration of juvenile salmonids into Hylebos Waterway. However, it is acknowledged that minor temporal lags (months) in recovery of productivity of disturbed littoral habitat could reduce feeding opportunities for small numbers of early migrating juvenile chinook salmon.

Dredging to occur in deeper subtidal areas would cause a short-term change in the characteristics of the subtidal benthic community. Studies indicate that the benthic community will recolonize rapidly following disturbance (McCauley *et al.* 1977; Swartz *et al.* 1980; Albright and Borithilette 1982; Romberg *et al.* 1995; Wilson and Romberg 1996), with peak population and biomass occurring two to three years after disturbance (Wilson and Romberg 1996). Therefore, the normal short-term reduction in benthic habitat and prey from this type of dredging will probably not be measurable in the action area.

The HHCG would dredge using a clamshell bucket. Clamshell dredges have a bucket of hinged steel with a “clamshell” shape that is suspended from a crane. The bucket, with its jaws open, is lowered to the bottom surface. When the force of the bucket weight hits the bottom, the clamp grabs a section of sediments (Nightingale and Simenstad 2001). Because the jaws are open during descent, a clamshell is unlikel to entrap or contain fish (Pacific International Engineering 2001b). Dredging with a mechanical clamshell bucket would increase suspended sediment concentrations throughout the entire depth of the water column at the point of dredging. Resuspension of sediment would occur during clamshell impact, closure, withdrawal, and lift to the haul barge. Clamshell dredging causes very limited, short-term, and localized turbidity; no long-term impacts should result from this turbidity.

Offloading and transport operations are not expected to have a measurable effect on water quality due to engineering controls, including avoidance and minimization measures to control and manage spillage. However, in the event that some material does unintentionally spill into the water during offloading, the impacts on water quality are expected to be minor and temporary, creating turbidity concentrations lower than those expected during dredging. Turbidity during offloading will be controlled primarily through in-situ water quality monitoring and engineering controls. Further, to avoid recontamination in the event that some material is lost during the transfer process, project construction has been sequenced so as to complete the dredging adjacent to the offloading dock last.

In summary, the EPA will require that HHCG will minimize the effects of dredging on listed species restricting work timing to periods when fish presence is minimized. The EPA will also monitor the chemical constituents, turbidity, DO and other in-water parameters, and will modify the dredging practices by conventional means (e.g., rate of dredging, changing bucket type, scheduling on tidal cycles), if any of the parameters exceed Clean Water Act water quality criteria.

2.2.1.2 Removal and Reconstruction of Structures

Demolition and reconstruction activities could also create minor short-term pulses of turbidity but these would not be expected to have measurable effect on DO concentrations in the Head of the Hylebos Waterway. The removal of 165 creosote-treated piles within the Hylebos Marina in 2004 and the removal of shoreline bulkheads, piers, and construction debris will improve the habitat connectivity and function within the Waterway. Reconfiguring the Hylebos Marina will have a net positive effect by reducing the amount of shading in littoral habitats.

The HHCG will conduct demolition and reconstruction following strict BMPs to limit the amount of debris entering the waterway and minimize accidental spills. Therefore, effects on water quality resulting from this work are not anticipated. Any material that enters the water will be collected and removed for proper disposal. If non-floatable demolition debris enters the waterway and sinks to the bottom before it is removed, the material will be removed during follow-on environmental dredging activities.

2.2.1.3 Pile Driving

Up to 190 creosote-treated wood piles (25 in 2003 and 165 in 2004) will be removed from the Hylebos Marina and the reconfigured marina will require replacement with approximately 164, 18- to 24-inch diameter hollow steel or concrete piles. Pile driving could temporarily increase the turbidity of surrounding waters, but much less so than the dredging activities. In addition, driving hollow steel pipe piles will temporarily increase the noise within the project area and create overpressure waves adjacent to the pile driving activity. While a vibratory hammer should routinely be used, it may be necessary to test or "proof" 5 to10% of the steel piles with an impact hammer to determine bearing capacity. Biological effects to PS chinook may result from the high sound pressures produced when driving hollow steel piles with an impact hammer. Extensive discussions of the impacts of driving hollow steel piles was provided in a recent NOAA Fisheries ESA consultation of the Hood Canal Bridge Retrofit and Replacement (NOAA Fisheries No. 2002/00546; NOAA Fisheries 2003a), portions of which are incorporated below.

Impact driving of steel piles can produce intense sound pressure waves that can injure and kill fishes (e.g., Longmuir and Lively 2001; Stotz and Colby 2001; Stadler, pers. obs. 2002; Blomberg, pers. comm. 2003; Carman, pers. comm. 2003; Desjardin, pers. comm. 2003). The injuries caused by such pressure waves are known as barotraumas, and include hemorrhage and rupture of internal organs, including the swimbladder and kidneys in fish, and damage to the auditory system. Death can be instantaneous, occur within minutes after exposure, or occur several days later. Fishes with swimbladders (which include salmonids) are sensitive to underwater impulsive sounds (sounds with a sharp sound pressure peak occurring in a short interval of time) because of swimbladder resonance, which is believed to occur in the frequency band of most sensitive hearing (usually 200 to 800 Hz) (Caltrans 2002). As the pressure wave passes through a fish, the swimbladder is rapidly squeezed due to the high pressure and then rapidly expanded as the underpressure component of the wave passes through the fish. At the high sound pressure levels (SPL) associated with pile driving, the swimbladder may repeatedly expand and contract, hammering the internal organs that cannot move away since they are bound by the vertebral column above and the abdominal muscles and skin that hold the internal organs in place below the swimbladder (Gaspin 1975). This pneumatic pounding may result in the rupture of capillaries in the internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues (Caltrans 2002).

Another mechanism of injury and death is "rectified diffusion," which is the formation and growth of bubbles in tissue caused in areas of high SPLs. Growth of bubbles in tissue by rectified diffusion can cause inflammation and cellular damage because of increased stress and strain (Vlahakis and Hubmayr 2000; Stroetz *et al.* 2001), and blockage or rupture of capillaries, arteries and veins (Crum and Mao 1996).

Hastings (2002) expects little to no physical damage to aquatic animals for peak SPLs below 190 dB (re: 1 μPa at 1 meter), the threshold for rectified diffusion (Crum and Mao 1996) (note: all decibel levels discussed hereafter will be with a reference pressure of 1 μPa). However, much uncertainty exists regarding the level of adverse effects to fish exposed to sound between 180 and 190 dBpeak due to species-specific variables. Turnpenny *et al.* (1994) reported a mortality rate of 57% for brown trout (*Salmo trutta*), 24 hours after exposure to 90-second bursts of pure tones at 95 Hertz at peak pressures below 173 dB. The authors suggested that the threshold for continuous sounds was lower than that for pulsed sounds such as seismic airgun blasts. This difference is thought to be due to the longer duty cycle of the pure tone bursts. The literature also suggests there may be adverse effects stemming from shifts in hearing, physical hearing damage, or equilibrium problems (Turnpenny *et al.* 1994; Hastings *et al.* 1996). Based on this information, NOAA Fisheries has established the threshold for physical injury at 180 dBpeak for this project.

Sound pressure levels expressed as "root-mean-squared" (rms) values are commonly used in behavioral studies. Sound pressure levels in excess of 150 dB rms are expected to cause temporary behavioral changes such as elicitation of a startle response or behavior associated with stress. These SPLs are not expected to cause direct permanent injury, but, as discussed above, may decrease a fish's ability to avoid predators. Shin (1995) reports that pile driving may result in "agitation" of salmonids indicated by a change in swimming behavior. Observations by Feist et al. (1992) suggest that sound levels in this range may disrupt normal migratory behavior of juvenile salmon. They also noted that when exposed to the sounds from pile driving, juvenile pink and chum salmon were less likely to startle and flee when approached by an observer than were those that were shielded from the sounds. Based on this information, NOAA Fisheries has established the threshold for behavioral disruption at 150 dB rms for this project.

Most reports of fish-kills associated with pile driving are limited to those fishes that were immediately killed and floated to the surface. However, physical harm to juvenile salmonids is not always expected to result in immediate, mortal injury – death may occur several hours or days later, while other injuries may be sublethal. Necropsy results from Sacramento blackfish exposed to high SPLs showed fish with extensive internal bleeding and a ruptured heart chamber were still capable of swimming for several hours (Abbott and Bing-Sawyer 2002). Sublethal injuries can interfere with the ability to carry out essential life-functions, such as feeding and avoiding predators.

Small fish subjected to high SPLs might be more vulnerable to predation, and the predators themselves may be drawn into the potentially harmful field of sound by following injured prey. The California Department of Transportation (cited in NOAA Fisheries 2003b) reported that the stomach of a striped bass killed by pile driving contained several freshly consumed juvenile herring. This striped bass appeared to have fed heavily on killed, injured, or stunned herring as it, too, swam into the zone of lethal sound pressure. Because adult salmonids are piscivorous they might be attracted to areas of dangerously high SPLs by the smaller fishes that are injured or killed.

Not all fishes killed by pile driving float to the surface. At the Port of Vancouver, British Columbia, divers found a large number of dead fishes, including salmonids, had sunk to the bottom (Desjardin, pers. comm. 2003). Teleki and Chamberlain (1978) found that up to 43% of the fishes killed by underwater explosions sank to the bottom. With few exceptions, fish-kills are reported only when dead and injured fishes are observed at the surface. Thus, the frequency and magnitude of such kills may be underestimated. The potential for fish injury from pile driving depends on the type and intensity of the sounds produced. These are greatly influenced by a variety of factors, including the type of hammer, the type of substrate and the depth of the water. Firmer substrates require more energy to drive piles into, and produce more intense sound pressures.

The small range of physical injury, combined with the expected low numbers of the smallest, shore-bound PS chinook outmigrants at the time of pile driving and the assumption that larger juvenile and adult PS chinook are less affected by the behavioral changes brought by pile driving, leads NOAA Fisheries to believe that this activity will have negligible adverse effect to listed salmonids. However, as discussed below, the EPA will implement measures to minimze these effects.

2.2.1.4 Natural Recovery

For specific portions of the Hylebos Waterway, the EPA's 1989 Record of Decision (ROD; EPA 1989) and 2000 Explanation of Significant Differences (ESD; EPA 2000b) selected natural recovery as the preferred remedial approach. Natural recovery is applicable to areas where surface sediments are predicted to recover to below SQO criteria within ten years following completion of remedial activities within the waterway. As specified in the ROD, natural recovery is only applicable to marginally impacted sediments - defined by the EPA as those with chemical concentrations less than the second lowest Apparent Effects Threshold value, or those with biological test results that do not exceed the minimum cleanup level values under the Washington State Sediment Management Standards. Where polychlorinated biphenyls (PCBs) are present, marginally impacted sediments are those with PCB concentrations between 300 and 450 micrograms per kilogram, as identified in the 1997 (EPA 1997a) and 2000 ESDs (EPA 2000b).

Based on detailed chemical and biological sampling, and modeling of natural recovery processes, the 2000 ESD and the Pre-Remedial Design Evaluation report (HCC 1999) concluded that the SMA 102, a 0.2-acre subtidal area beneath the Weyerhaeuser Dock will not be remediated.

The EPA believes that the no-action remedial activity for this SMAs does not constitute an impact on listed species; however, such natural recovery sites will be rigorously monitored as part of the long-term Operations, Maintenance, and Monitoring Plan. Natural recovery monitoring in these areas will include analysis for all chemicals present above SQO criteria during the most recent sampling. The monitoring results will be used to verify the effectiveness of natural recovery in terms of reducing concentrations of these constituents of concern. Should future performance monitoring results confirm the predicted reduction in concentrations of contaminant in the ten-year period, no further remedial activities are planned. NOAA Fisheries considers the EPA's decision to conduct no remediation on this SMA to be part of their overall action under ESA.

2.2.1.5 Transition Zone Grading Effects

Where the dredging areas occur along existing structures (docks, piers, etc.) and the upstream and downstream ends of project, it is necessary to make a transition so the final dredge cut slope can be covered with sand and naturally-rounded gravel to stabilize the interface. This transition zone blanket will be 25 feet wide by 3 feet thick along the entire face of the dredge cut and will be applied at 12 discrete locations. These activities will result in temporary and localized increases in suspended sediment concentrations as the clean material descends through the water column. The coarse nature (sand and gravel) of the grading materials creates less turbidity and for a shorter period of time, compared to turbidity caused by dredging. Research by MEC Analytical (1997) indicates that fine sand and larger particles sank to the bottom within minutes.

There is also the potential that existing surface sediment would be suspended at the point of impact as the clean material comes in contact with the bottom (Truitt 1986; Pequegnat 1983). Data collected after the placement of a sand cap over very fine, unconsolidated material at sites in Puget Sound using a low-energy delivery system showed that little or no sediment was entrained in the clean cap (Parametrix 1989; EPA 2000a; Anchor 2001). Based on these studies, the potential for re-suspension of bottom sediment during placement of transition zone select materials is expected to be minimal.

The sand and gravel materials will be clean, oxygenated, and have low organic content so should have little effect on dissolved oxygen, water or sediment quality resulting in an improved habitat quality and function (*i.e.*, epibenthic prey production) while maintaining the existing level of erosion protection. Further, the transition areas will be at a slope similar to the existing condition and will not lead to a loss of littoral habitat. However, the transition zone grading will occur over a small area of littoral and subtidal habitat. The placement of this material will smother existing benthic and epibenthic organisms. As with littoral areas disturbed by dredging, recolonization by epibenthic organisms is expected to occur rapidly (within months) after placement of materials. Based on the construction schedule (temporary cessation of in-water construction by mid-February of each year) and the expected rapid recolonization by epibenthic prey, littoral habitat would not experience a significant loss of function that would affect juvenile salmonids.

Minimization measures to reduce the concentration of suspended sediment during placement of transition zone material will be employed during construction. Further, due to the construction schedule, construction will occur when juvenile chinook salmon are not present in significant numbers in the action area, and turbidity is expected to have little or no adverse impacts on listed species.

2.1.4.1.6 Interrelated and Interdependent Actions. Effects of the action are analyzed together with the effects of other activities that are interrelated to, or interdependent with the proposed action. An interrelated action is one that is part of the proposed action, or depends on the proposed action for its justification. An interdependent action is one that has no independent utility apart from the proposed action. Guidance developed by NOAA Fisheries to assist biologists conducting interagency consultation suggests that as a practical matter, the determination of whether other actions are interrelated to, or interdependent with the proposed action, should be made using the "but for" test. That is, whether the potentially interrelated or interdependent actions would occur but for the occurrence of the proposed action. If the action in question would not occur but for the occurrence of the proposed action, then the effects of action in questions must be analyzed taken with the effects of the proposed action.

For this consultation, NOAA Fisheries finds that the reconfiguring of the Hylebos Marina is an interdependent action which requires the COE to conduct a section 10 of the Rivers and Harbors Act of March 3, 1899 permit review. Since this work proposed in the COE's Public Notice of Application for Permit (June 25, 2003; Ref. No.: 2003-00481) is being accomplished as part of a Superfund Cleanup of the Hylebos Waterway, EPA retains responsibility for section 7 ESA compliance and consultation has been integrated into this Opinion.

2.2.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably to occur (50 CFR 402.02). Indirect effects may occur outside the area directly affected by this action. For this consultation, no obvious indirect effects have been found.

2.3 Cumulative Effects

Cumulative effects are defined as "those effects of future State or private activities, not involving Federal activities, that are reasonable certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02). The proposed action is within a portion of the Hylebos Waterway, which has been previously altered by dredging, filling and other anthropogenic activities. However, future Federal actions that will impact the action area, such as navigational dredging and other activities permitted under section 404 of the Clean Water Act or section 10 of the Rivers and Harbors Act, will be reviewed under separate section 7 consultations, and cannot be considered cumulative effects.

Other effects in the action area are those from restoration actions taking place as a part of Commencement Bay Natural Resource Damage Assessment pursuant to CERCLA (USFWS and NOAA, 1997; Kerwin 1999). Landscape and watershed scale restoration sites have also been identified to increase connectivity between important salmon habitat transition regions (Simenstad 2000). It is particularly difficult to detect, with confidence, the effects of habitat improvements based on observed run size trends. It has been estimated that, because of inherent variability, it would take 30 years to detect a 50% improvement in average production, if we were to use adult run size as the response variable (Lichatowich and Cramer 1979; Mobrand Biometrics 2001).

2.4 Conclusion

Having evaluated the collective effects of the proposed action, the environmental baseline, and any cumulative effects, and taking into account measures for survival and recovery specific to the listed species' life stage, NOAA Fisheries finds that the proposed action may result in short-term adverse impacts to chinook salmon due to in-water work activities, but does not jeopardize the continued existence of the ESU. In arriving at a non-jeopardy conclusion for this action, the minimization measures to avoid work in the juvenile salmonid migration period, and engineering BMPs controls were important to consider, as was the establishment of clean substrates which supports increased benthic diversity and productivity.

Of the 10 salmonid indicators, five were found to maintain, five (water quality, sediment quality, estuarine habitat access, shoreline modification, and benthic prey) were found to restore or improve baseline in the long-term and one (benthic prey) was found to temporarily degrade then return back to baseline conditions or better. Based on the potential for benthic impacts, NOAA Fisheries agrees with the EPA's conclusion that the remedial action could temporarily degrade the baseline condition for benthic prey at the point of project dredging. Over the long term, removal of highly contaminated sediments and creosote-treated pilings are beneficial aspects of the proposed action that will restore the baseline condition for water quality. NOAA Fisheries agrees with the EPA's conclusions that the remedial action will address risks to the environment and public health, reduce the levels of chemical constituents in sediment and thereby help improve and restore salmon habitat in Commencement Bay.

2.5 Reinitiation of Consultation

This concludes formal consultation on this proposed action in accordance with 50 CFR 402.14(b)(1). The EPA must reinitate this ESA consultation if: (1) new information reveals effects of the action that may affect listed species in a way not previously considered; (2) new information reveals the action causes an effect to listed species that was not previously considered; or (3) a new species is listed or critical habitat designated that may be affected by the identified actions. In instances where the amount or extent of authorized incidental take is exceeded, any operation causing such take must cease pending conclusion of the reinitiated consultation.

2.6 Incidental Take Statement

The ESA at section 9 (16 U.S.C. 1538) prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by regulation promulgated under ESA section 4(d) (see 50 CFR 223.203). Take is defined by the statute as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (16 U.S.C. 1532(19)). Harm is defined by regulation as “an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering”(50 CFR 222.102). Harass is defined as “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering” (50 CFR 17.3). Incidental take is defined as “takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant” (50 CFR 402.02). The ESA at section 7(o)(2) removes the prohibition from incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement (16 USC 1536).

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides Reasonable and Prudent Measures (RPM) that are necessary to minimize the effects, and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.6.1 Amount or Extent of Take Anticipated

The in-water dredging, removal and reconstruction of structures, pile driving, and transition zone grading construction activities of the proposed action are generally scheduled to occur during a period of time (July 16 - February 14) when few individuals of the listed species are expected to be present in the action area. However, PS chinook use the action area in a way that they are highly likely to experience the various environmental effects of the activities that will be carried out under the proposed action. Therefore, the incidental take of PS chinook is reasonably certain to occur.

Incidental take is likely in the form of harm, or habitat modification that kills or injures fish by impairing certain normal behavioral patterns (feeding, rearing, migrating, etc.). Because in-water work is timed to reduce the exposure of PS chinook to projects effects to the fewest individuals possible, and because incidental take is likely mainly from habitat modification, NOAA Fisheries cannot quantify the precise number of individual fish that might be taken. In such circumstances, NOAA Fisheries characterizes the take as unquantifiable and uses a surrogate to estimate the extent of take. The extent of habitat affected by an action can be a surrogate measure for take.

In this action, the amount of habitat modification anticipated can be assigned by the construction activity based on the amount of change or activity in the littoral zone where juvenile chinook salmon could be found. Dredging will remove contaminated sediments in approximately 40.6 acres, 37.1 acres of which are open water of various depths where even fewer juvenile chinook would be expected to occur during their usual shoreside, seaward migration. In total, the amount of littoral habitat favored by PS chinook affected by this project is approximately 6.4 acres.

Take is also likely from exposure of fish to pile-driving and other in-water operations such as the reinstallation of the Kaiser outfall. In this proposed action, juvenile chinook salmon are reasonably certain to be injured throughout the 40.6 acres of the project footprint but with different levels of potential injury. NOAA Fisheries anticipates, and would exempt from the take prohibition, a 10% exceedence of the affected littoral area (0.6 acres), a 16-piling increase in the total of the 164 replacement piling, and an eight-piling test ("proof") of hollow steel piles if an impact hammer is used. Any amount of dredging over 10%, piles more than 16 beyond those planned, or more than eight hollow steel piles tested with an impact hammer (without employing hydroacoustic monitoring and/or bubble curtains), would exceed the anticipated extent of incidental take and require reinitiation per the provisions in 2.4, above.

2.6.2 Reasonable and Prudent Measures

The following RPMs are necessary and appropriate to minimize the take of PS chinook:

1. The EPA will minimize incidental take during dredging activities.

2. The EPA will minimize incidental take during demolition and reconstruction of over-water structures activities.

3. The EPA will minimize incidental during pile driving activities.

4. The EPA will minimize incidental take during construction transition zone grading activities.

2.6.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the EPA must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms are non-discretionary:

1. To implement all reasonable and prudent measures, above, the EPA shall:

    a) Include these terms and conditions as remedial requirements under Superfund orders to HHCG.

    b) The EPA shall comply with the in-water work window of July 16 through February 14 when the chance of encountering chinook salmon is minimal.

2. To implement reasonable and prudent measure No. 1, the EPA shall, while dredging, comply with all conservation measures appropriate for dredging from section 14 of the BA Addendum.

3. To implement reasonable and prudent measure No. 2, the EPA shall, while demolishing and reconstructing over-water structures, comply with all the conservation measures appropriate for demolition and reconstruction from section 14 of the BA Addendum.

4. To implement reasonable and prudent measure No. 3, the EPA shall, while pile driving:

    a) Ensure that, providing substrate conditions are appropriate, vibratory hammers are used to drive all piles. If substrate conditions are not appropriate, impact hammers may be used. Impact hammers driving hollow steel piles (concrete piles are excluded) will require hydroacoustic monitoring and use of a bubble curtain if the pressure thresholds are exceeded, as described below, or the automatic use of a bubble curtain without monitoring.

    b) Have the HHCG's contractor develop an acceptable design for a bubble curtain to be used during in-water driving of hollow steel piles with an impact hammer, equivalent or better than that described by Longmuir and Lively (2001).

    c) Have the HHCG develop and implement an hydroacoustic monitoring plan if bubble curtains are not routinely deployed. The plan should monitor for peak and rms sound pressure level generated during the impact driving of steel piles. The plan shall be reviewed and approved by NOAA Fisheries. No monitoring or sound attenuation measures will be required for piles driven in the dry beach at low tide, vibratory driving of any type of pile, or impact driving concrete piles. During hydroacoustic monitoring, the hydrophone shall be positioned at mid-depths, 10 meters distant from the pile being driven.

        I) If sound pressure levels exceed 150 dBrms (re: 1 µPa) (0.032 KPa) for fewer than 50% of the impacts and never exceed 180 dBpeak (re: 1 µPa at 1 meter) (1 KPa), pile driving may proceed without further restriction; or

        ii) If rms sound pressure levels exceed 150 dB for 50% or more of the impacts, or peak pressures ever exceed 180 dB, pile driving may continue, but only with the use of a bubble curtain.

iii) If an unconfined bubble curtain is used, monitoring must show that it functions at all tidal stages. If it does not, then the confined bubble curtain must be utilized. If a confined bubble curtain is used, no other sound attenuation measures will be required, regardless of the attenuation it provides, or the tidal conditions during use.

iv) Within 60 days of completing the hydroacoustic monitoring, a report shall be submitted to NOAA Fisheries, Washington Habitat Branch, Lacey, Washington (Attn. Dr. John Stadler; John.Stadler@noaa.gov). The report shall include a description of the monitoring equipment and for each pile monitored, the peak and rms sound pressure levels with and without a bubble curtain, the size of pile, the size of hammer and the impact force used to drive the pile, the depth the pile was driven, the depth of the water, the distance between hydrophone and pile, and the depth of the hydrophone.

v) The EPA shall have a fisheries-qualified biologist observing and sampling for serious fish impacts during the initial two days of driving steel piles with an impact hammer. Should any chinook salmon demonstrate mortality or obvious stress, piling driving will cease and the EPA will notify NOAA Fisheries (Attn. Dr. Robert Clark, 206-526-4338; Robert.Clark @NOAA.gov).

5. To implement reasonable and prudent measure No. 4, the EPA shall, while conducting the Transition Zone Grading, comply with all conservation measures appropriate for placement and grading of the Transition Zone material from section 14 of the BA Addendum.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (Sect. 305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or State action that would adversely affect EFH (Sect. 305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (Section 305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide effects, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies regarding any activity that may adversely affect EFH, regardless of its location. The objective of this EFH consultation is to determine whether the proposed action may adversely affect designated EFH, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for federally-managed fisheries within the waters of Washington, Oregon, and California. The designated EFH for groundfish and coastal pelagic species encompasses all waters from the mean high water line, and upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon and California, seaward to the boundary of the U.S. exclusive economic zone (370.4 km) (PFMC 1998a, 1998b). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999). In estuarine and marine areas, designated salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent of the exclusive economic zone (370.4 kilometers) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border.

Detailed descriptions and identifications of EFH are contained in the fishery management plans for groundfish (Casillas *et al.* 1998, PFMC 1998a), coastal pelagic species (PFMC 1998b), and Pacific salmon (PFMC 1999). Assessment of the effects to these species' EFH from the proposed action is based on these descriptions and information provided by the EPA.

3.3 Proposed Action

The proposed action is detailed above in section 1 of this Opinion, is within the marine waters of Commencement Bay, and include habitats which have been designated as EFH for various life stages of 46 species of groundfish, four coastal pelagic species, and three species of Pacific salmon (Table 3).

Table 3. Species of fishes with designated EFH in Puget Sound.

Groundfish Species	redstripe rockfish *S. proriger*	Dover sole *Microstomus pacificus*
spiny dogfish *Squalus acanthias*	rosethorn rockfish *S. helvomaculatus*	English sole *Parophrys vetulus*
big skate *Raja binoculata*	rosy rockfish *S. rosaceus*	flathead sole *Hippoglossoides elassodon*
California skate *Raja inornata*	rougheye rockfish *S. aleutianus*	petrale sole *Eopsetta jordani*
longnose skate *Raja rhina*	sharpchin rockfish *S. zacentrus*	rex sole *Glyptocephalus zachirus*
ratfish *Hydrolagus colliei*	splitnose rockfish *S. diploproa*	rock sole *Lepidopsetta bilineata*
Pacific cod *Gadus macrocephalus*	striptail rockfish *S. saxicola*	sand sole *Psettichthys melanostictus*
Pacific whiting (hake) *Merluccius productus*	tiger rockfish *S. nigrocinctus*	starry flounder *Platichthys stellatus*
black rockfish *Sebastes melanops*	vermilion rockfish *S. miniatus*	arrowtooth flounder *Atheresthes stomias*
bocaccio *S. paucispinis*	yelloweye rockfish *S. ruberrimus*	
brown rockfish *S. auriculatus*	yellowtail rockfish *S. flavidus*	**Coastal Pelagic Species**
canary rockfish *S. pinniger*	shortspine thornyhead *Sebastolobus alascanus*	anchovy *Engraulis mordax*
China rockfish *S. nebulosus*	cabezon *Scorpaenichthys marmoratus*	Pacific sardine *Sardinops sagax*
copper rockfish *S. caurinus*	lingcod *Ophiodon elongatus*	Pacific mackerel *Scomber japonicus*
darkblotch rockfish *S. crameri*	kelp greenling *Hexagrammos decagrammus*	market squid Loligo opalescens
greenstriped rockfish *S. elongatus*	sablefish *Anoplopoma fimbria*	**Pacific Salmon Species**
Pacific ocean perch *S. alutus*	Pacific sanddab *Citharichthys sordidus*	chinook salmon *Oncorhychus tshawytscha*
quillback rockfish *S. maliger*	butter sole *Isopsetta isolepis*	coho salmon *O. kisutch*
redbanded rockfish *S. babcocki*	curlfin sole *Pleuronichthys decurrens*	Puget Sound pink salmon *O. gorbuscha*

3.4 Effects of Proposed Action

As described in detail in section 2.2 of this document, the proposed action may result in detrimental short- and long-term effects to a variety of habitat parameters. These adverse effects are:

1. Short-term degradation of benthic foraging habitat during dredging, structures removal/reconstruction, and Transition Zone grading activities.

2. Short-term degradation of water quality (e.g., elevated turbidity or the accidental release of contaminants including petroleum products, chemicals or deleterious materials) because of in-water and over-water construction activities.

3. Short-term production of high sound pressure levels during the impact driving of hollow steel piles that may injure or kill fish.

3.5 Conclusion

NOAA Fisheries believes that the proposed action may adversely affect the EFH for the groundfish, coastal pelagic, and Pacific salmon species listed in Table 3.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that would adversely affect EFH. NOAA Fisheries was invited by the EPA and HHCG to recommend conservation measures during the preparation of the BA so that, with the exception of the pile driving (EFH Effect No. 3), all of NOAA Fisheries' concerns have been adequately minimized by the stated conservation measures and BMPs (section 14) in the BA. To minimize the effect of pile driving and conserve EFH, NOAA Fisheries recommends that the EPA implement the following conservation measures:

a) Steel piles should be driven with a vibratory hammer when substrate conditions are appropriate. The underwater sound produced by vibratory hammers appear to pose a lower risk to fishes than do the sounds produced by impact hammers.

b) If impact hammers are used to drive steel piles, hydroacoustic monitoring of the underwater sound pressure levels should be conducted, and if the thresholds for adverse effects to fishes are exceeded, a bubble curtain should be deployed. A report detailing the results of the hydroacoustic monitoring should be provided to NOAA Fisheries. Details on the recommended sound pressure thresholds, hydroacoustic monitoring protocols, bubble curtain design and hydroacoustic monitoring reports are found in section 2.5.3 of this document. If a bubble curtain is deployed initially, no hydroacoustic monitoring is necessary.

c) A fisheries-qualified biologist should be present during impact driving of steel piles to observe and report any apparent adverse effects to fishes.

3.7 Statutory Response Requirement

Pursuant to the MSA (Sec. 305(b)(4)(B)) and 50 CFR 600.920(k), Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse effects of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The EPA must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

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FIGURE 1 - PROJECT AREA AND ACTION AREA MAP

APPENDIX I

Biological Assessment Addendum - section 14 - Conservation Measures